

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

97-030

INSTRUCTIONS

1. The preparing activity must complete blocks 1,2, 3, and 8. In block 1, both the document number and revision letter should be given.
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I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-STD-23012. DOCUMENT DATE (YYMMDD)
930618

3. DOCUMENT TITLE

Computer Graphics Metafile (CGM) Implementation Standard For The National Imagery Transmission Format Standard

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

The proposed changes add the following features to the MIL-STD-2301 profile of CGM:

- 1- Capability for edge visibility to be set either on or off rather than the current default of always on.
- 2- Increase the range of allowed line widths from 2,4&6 pixels to the range of 1 to at least 100 pixels.
- 3- Add specification for the control of degeneracies which was not addressed previously in the standard.
- 4- Allow for the explicit declaration of defaults currently only done implicitly.
- 5- Allow for the presence of the null character in character strings.
- 6- Introduce an updated metafile description structure.
- 7- Add capability for Auxiliary Color and Transparency control commands.
- 8- Add definition for consistent rendering of lines and edges.
- 9- Increase allowed range of font sizes.
- 10- Add additional line and edge types.
- 11- Add new graphic primitive for polygon sets.

See attachment.

5. REASON FOR RECOMMENDATION

The proposed changes rectify some of the deficiencies of the current profile that have been experienced during the implementation and fielding of NITF2.0. Several of the proposed additions and modifications are intended to help posture future implementations of MIL-STD-2301 for the transition of the standard into an International Standardize Profile (ISP) of CGM.

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Recommend that the following changes be made to MIL-STD-2301:

1. Allow the Edge Visibility CGM element to be turned ON or OFF.

A. Nature of Changes:

In paragraphs 5.1.1.4.7 (page 37) and 5.1.2.4.7 (page 69), change line 3 from “(1= on)” to “(0=off, 1=on)”. In tables 34 and 87, make the following changes:

From

5	30	2	=0x53C2
1			=0x0001

To

5	30	2	=0x53C2
EDGE_VISIBILITY			

B. Rationale For Recommendation:

Experience with the field use of NITFS systems indicates the need to increase the allowed options for this feature.

2. Edge and Line Width increases.

A. Nature of Change:

Change Page 99, paragraph 5.2.2.2.14 to:

5.2.2.2.14 Edge Widths for Output. The CGM implementation for NITFS shall provide the capability to generate and output edge widths of two, four or six, and optionally, of 1 through 100 for the Edge Width element.

Change Page 99, paragraph 5.2.2.2.15 to:

5.2.2.2.15 Line Widths for Output. The CGM implementation for NITFS shall provide the capability to generate and output line widths of two, four or six, and optionally, of 1 through 100 for the Line Width element.

B. Rational For Recommendation:

Experience with the field use of NITFS systems indicates the need to allow for a more robust line and edge width capability.

3. Prevention of degenerate cases:

A. Nature of Change:

Add a new paragraph to page 103/104 following table 110.

5.2.2.2.35 Degeneracy. The CGM implementation for NITFS is precluded from generating and outputting degenerate CGM elements.

B. Rationale For Recommendation:

The MIL-STD currently does not define how to deal with degeneracy. By preventing producers from creating degenerative cases, the standard does not have to establish a complex set of rules for interpretation in order to achieve a uniform presentation when displaying the CGM elements.

4. Defaults

A. Nature of Change:

Change paragraph 5.2.2.1.35 CGM element defaults for input, on page 95:

From:

5.2.2.1.35 CGM element defaults for input. The CGM implementation for NITFS shall assume all CGM default values as stated in the Part 3 - Binary Encoding in the FIPS PUB 128 for each CGM that the CGM implementation inputs and interprets unless otherwise specified in this document. This table includes but is not limited to the following:

To:

5.2.2.1.35 CGM element defaults for input. The CGM implementation for NITFS shall assume all CGM default values as stated in the Part 3 - Binary Encoding in the FIPS PUB 128 for each CGM that the CGM implementation inputs and interprets when these elements are not expressly included in the CGM unless otherwise specified in this document. The CGM element defaults for input include, but are not limited to those listed in table 109.

Change paragraph 5.2.2.2.34 CGM element defaults for output, on page 102:

From:

5.2.2.2.34 CGM element defaults for output. The CGM implementation for NITFS shall assume all CGM default values as stated in the Part 3 - Binary Encoding in the FIPS PUB 128 for each CGM that the CGM implementation generates and outputs unless otherwise specified in this document. This table includes but is not limited to the following:

To:

5.2.2.2.34 CGM element defaults for output. The CGM implementation for NITFS shall assume all CGM default values as stated in the Part 3 - Binary Encoding in the FIPS PUB 128 for each CGM that the CGM implementation generates and outputs unless otherwise specified in this document. The CGM element defaults for output include, but are not limited to those listed in table 110. Since this standard only specifies a single value or option, these elements, although permitted, never need to appear in a CGM.

Delete the row 'Transparency' from Table 110.

B. Rationale For Recommendation:

The current MIL-STD prohibits these elements from appearing in the CGM file. This change is needed to posture for future use of a CGM ISP. Based on ISO 8632, these items must at least be permitted by the ISP and therefore may optionally be included in the file. The defaults are used when the element is not included in the file, but is required by the interpreter for processing and presentation. Implementations must be able to handle these elements if present, even if not needed. See recommendation 7 for rationale to remove 'Transparency' from Table 110.

5. Null Character

A. Nature of Change:

Change paragraph 3.2 Definitions used in this standard, page 6.

From:

a. Character -1. A letter, digit, or other symbol that is used as part of the organization, control, or representation of data. 2. One of the units of an alphabet. Note: For Mil-STD-2301, a character (ANSI 3.4-1986 7 bit ASCII code padded into 8-bits) is an unsigned integer between and including 32 and 126 and is specified in this document using the character array C1, C2, ... Cn.

To:

a. Character -1. A letter, digit, or other symbol that is used as part of the organization, control, or representation of data. 2. One of the units of an alphabet. Note: For Mil-STD-2301, a character (ANSI 3.4-1986 7 bit ASCII code padded into 8-bits) is an unsigned integer between and including 32 and 126, for and is specified in this document using the character array C1, C2, ... Cn. The unsigned integer value of 0 (null) is also an allowed character value.

B. Rationale For Recommendation:

This allows the MIL-STD to fall in line with the ISO and the model ISP.

6. Metafile Description

A. Nature of Change:

Change paragraph 5.2.2.1.1 Metafile Description element contents required for input. page 90 and paragraph 5.2.2.2.2 Metafile Description element contents required for output. page 96

From:

"NITF/CGM-APP-2.0."

To:

"NITF/CGM-APP-2.0.", for CGM placed in NITF2.0 and/or NITF2.1 files.

And optionally, for NITF2.1 files only:

"ProfileId:NITF/CGM;ProfileEd:2301-2;Source:(producer);Date:(YYYYMMDD)"

Where 'producer' is the application name and release/version of the application producing or modifying the CGM. The date shall reflect the creation date or most recent date of modification.

B. Rationale For Recommendation:

This new structure for the file description is in the form that will be required by the forthcoming ISP. Requiring interpret implementations to accept this structure will help posture them for the future transition.

7. Auxiliary Color/Transparency

A. Nature of Change:

On page 8, add paragraph 4.1.e Metafile Control Elements.

e. Metafile Control Elements.
TRANSPARENCY
AUXILIARY COLOR

On page 9, paragraph 4.3, add the following elements to the list under BEGIN PICTURE BODY prior to [TEXT COLOR]:

[TRANSPARENCY]
[AUXILIARY COLOR]

Page 49, Renumber paragraph 5.1.1.6 CGM binary encoding. to paragraph 5.1.1.8
Page 50, Renumber paragraph 5.1.1.6.1 CGM binary encoding for input. to paragraph 5.1.1.8.1
Page 87, Renumber paragraph 5.1.2.6 CGM binary encoding. to paragraph 5.1.2.8
Page 88, Renumber paragraph 5.1.2.6.1 CGM binary encoding for output. to paragraph 5.1.2.8.1

Add paragraph 5.1.1.6 Control elements.

5.1.1.6 Control elements. The following control elements are used to describe the visual effects of auxiliary color and transparency.

Add paragraph 5.1.1.6.1 Auxiliary Color. and Table 55A:

5.1.1.6.1 Auxiliary Color. The CGM implementation for NITFS shall provide the capability to input and interpret the Auxiliary Color element using the following format. The Auxiliary Color element is used in conjunction with the LINE TYPE, EDGE TYPE, and TEXT. The Red, Green, and Blue (RGB) values are specified using a single byte. The last byte of the command shall be a null byte.

TABLE 55A. Auxiliary Color input.

MSB																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
0																
3				3						3						= 0x3063
RED								GREEN								
BLUE								0								

Add paragraph 5.1.1.6.2 Transparency. and Table 55B:

5.1.1.6.2 Transparency. The CGM implementation for NITFS shall provide the capability to input and interpret the Transparency element using the following format. The TRANSPARENCY parameter can be off (0) or on (1).

TABLE 55B. Transparency input.

MSB																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
0																
3				4								2				= 0x3082
TRANSPARENCY																

Add paragraph 5.1.2.6 Control elements.

5.1.2.6 Control elements. The following control elements are used to describe the visual effects of auxiliary color and transparency.

Add paragraph 5.1.2.6.1 Auxiliary Color.

5.1.2.6.1 Auxiliary Color. The CGM implementation for NITFS shall provide the capability to generate and output the Auxiliary Color element using the following format. The Auxiliary Color element is used in conjunction with the LINE TYPE, EDGE TYPE, and TEXT. The Red, Green, and Blue (RGB) values are specified using a single byte. The last byte of the command shall be a null byte.

TABLE 108A. Auxiliary Color input.

MSB															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
0															
3				3						3					= 0x3063
RED								GREEN							
BLUE								0							

Add paragraph 5.1.2.6.2 Transparency.

5.1.2.6.2 Transparency. The CGM implementation for NITFS shall provide the capability to generate and output the Transparency element using the following format. The TRANSPARENCY parameter can be off (0) or on (1).

TABLE 108B. Transparency input.

MSB															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
0															
3				4						2					= 0x3082
TRANSPARENCY															

Add two paragraphs after 5.2.2.1.34 and renumber following paragraphs in the sequence.

5.2.2.1.35 Auxiliary Color for input. The CGM implementation for NITFS shall be able to input and interpret the Auxiliary Color element when used in conjunction with EDGE TYPE, LINE TYPE, and TEXT.

5.2.2.1.36 Transparency for input. The CGM implementation for NITFS shall be able to input and interpret the Transparency element when used in conjunction with EDGE TYPE, LINE TYPE, and TEXT.

Add two paragraphs after 5.2.2.2.33 and renumber following paragraphs in the sequence.

5.2.2.2.34 Auxiliary Color for output. The CGM implementation for NITFS shall provide the capability to generate and output the Auxiliary Color element in support of EDGE TYPE, LINE TYPE, and TEXT.

5.2.2.2.35 Transparency for output. The CGM implementation for NITFS shall provide the capability to generate and output the Transparency element as either (1 = on) or (0 = off) in support of EDGE TYPE, LINE TYPE, and TEXT.

B. Rationale For Recommendation:

The current standard only allows for text to be a specified color on transparent. To simulate the previously used 'label' construct which had backgrounds other than transparent, current implementations have been placing a colored rectangle beneath the text. This results in a potential for receivers to not portray the text as intended by the originator. This occurs when a receiver doesn't support the specified font or size and does a font substitution. Often, the substituted font size causes the text to either extend beyond the underlying rectangle or to not be centered within the rectangle. In either case, the appearance looks flawed to the receiver. This change will allow a background to be defined for the immediate area of graphical text. It also allows for the display of line and edge segments that can be dashed using two colors as well as a single color on transparent.

8. Add more specific specification for rendering line and edge widths.

A. Nature of Changes:

Add the following sentence to paragraphs 5.2.2.1.8 Edge Width Specification Mode element for input and 5.2.2.2.7 Edge Width Specification Mode element for output.

The representation of edge widths shall be centered (within plus or minus one pixel) on the ideal mathematically-defined edge of the area.

Add the following sentence to the following paragraphs 5.2.2.1.9 Line Width Specification Mode element for input and 5.2.2.2.8 Line Width Specification Mode element for output.

The representation of line widths shall be centered (within plus or minus one pixel) on the ideal mathematically-defined center of the line.

B. Rationale for recommendation:

The specification of how to visually represent line and edge widths is missing from the standard. This has caused ambiguity resulting in differences in how these features are implemented in various systems.

9. Increase allowed range of font size and clarify character height substitution rules.

A. Nature of Changes:

Change paragraph 5.2.2.1.21.

From:

5.2.2.1.21 Character Height requirements for input. The CGM implementation for NITFS shall be able to substitute default system text heights for any unsupported character height in the Character Height element.

To:

5.2.2.1.21 Character Height requirements for input. The CGM implementation for NITFS shall be able to substitute default system text heights for any unsupported character height in the Character Height element. The implementation shall at least support character heights within the range of 6 through 72, although not all values within the range need to be supported for each font. When receiving an unsupported character height, the substituted height shall be the next lowest supported value for the font.

Change paragraph 5.2.2.2.20:

From:

5.2.2.2.20 Character Height requirements for output. The CGM implementation for NITFS shall generate and output the Character Height element within 10 through 38 inclusive.

To:

5.2.2.2.20 Character Height requirements for output. The CGM implementation for NITFS shall generate and output the Character Height element with a value no less than 6. There is no constraint on the upper limit value. (Note: interpret implementations must at least support the range of 6 through 72.)

B. Rationale for recommendation:

Current limitations have proven to be too constrained for field use.

10. Add additional line and edge types.

A. Nature of Changes:

Change paragraphs

From:

5.2.2.2.16 Edge types required for output. The CGM implementation for NITFS shall generate and output edge types of solid (1) and dashed (2) to the Edge Type Element.

5.2.2.2.17 Line types required for output. The CGM implementation for NITFS shall generate and output line types of solid (1) and dashed (2) to the Line Type Element.

To:

5.2.2.2.16 Edge types required for output. The CGM implementation for NITFS shall generate and output edge types of solid (1), dashed (2), dotted (3), dash-dot (4), and dash-dot-dot (5) to the Edge Type Element.

5.2.2.2.17 Line types required for output. The CGM implementation for NITFS shall generate and output line types of solid (1), dashed (2), dotted (3), dash-dot (4), and dash-dot-dot (5) to the Line Type Element.

B. Rationale for recommendation:

Experience with the field use of NITFS systems indicates the need to allow for a more robust use of edge and line types.

11. Add new graphic primitive for polygon sets.

A. Nature of Changes:

On page 7/8, add to paragraph 4.1.d Metafile Graphical Primitives with Associated Attributes.
Filled-Area Primitive Elements with Attributes:

POLYGON SET

On page 9/10, paragraph 4.3, add the following element to the list under BEGIN PICTURE BODY after [POLYGON]:

[POLYGON SET]

Add paragraph and tables after 5.1.1.5.2 and 5.1.2.5.2

5.1.1.5.2.1 Polygon Set element input. The CGM implementation for NITFS shall provide the capability to input and interpret the Polygon Set element using the following format. The polygon set parameters consist of a list of pairs of coordinates indicating the vertices of each polygon in the polygon set along with the Edge_Out_Flag indicating the edge visibility and whether the vertex is the last (closure) vertex of the specific polygon in the set. The first vertex of the first polygon (Vertex_11X, Vertex_11Y, Edge_Out_Flag_11) is connected to the last (Vertex_1(N)X, Vertex_1(N)Y, Edge_Out_Flag_1(N)) vertex in the first polygon followed by the vertices of each successive polygon in like manner. Polygon Sets are not "clipped" to the image boundary; therefore, some coordinates may specify off-image or off-screen locations, including negative locations. The Edge_Out_Flag parameter can be Invisible (0), Visible (1), Close Invisible (2), or Close Visible (3). Note, the parameter list length is given as the total number of bytes for all vertex parameters (6N).

TABLE 46A. Polygon Set short form input.

MSB															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
4				8								parameter list length (6N)			
Vertex_11X															
Vertex_11Y															
Edge_Out_Flag_11															
Vertex_12X															
Vertex_12Y															
Edge_Out_Flag_12															
⋮															
Vertex_1(N)X															
Vertex_1(N)Y															
Edge_Out_Flag_1(N)															
Vertex_21X															
Vertex_21Y															
Edge_Out_Flag_21															
Vertex_22X															
Vertex_22Y															
Edge_Out_Flag_22															
⋮															
Vertex_2(N)X															
Vertex_2(N)Y															
Edge_Out_Flag_2(N)															
⋮															
Vertex_(n)1X															
Vertex_(n)1Y															
Edge_Out_Flag_(n)1															
Vertex_(n)2X															
Vertex_(n)2Y															
Edge_Out_Flag_(n)2															

\vdots
Vertex _(n) (N)X
Vertex _(n) (N)Y
Edge_Out_Flag _(n) (N)

TABLE 46B. Polygon Set long form input.

MSB	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	4				8								31			
parameter list length (6N)																
Vertex_11X																
Vertex_11Y																
Edge_Out_Flag_11																
Vertex_12X																
Vertex_12Y																
Edge_Out_Flag_12																
⋮																
Vertex_1(N)X																
Vertex_1(N)Y																
Edge_Out_Flag_1(N)																
Vertex_21X																
Vertex_21Y																
Edge_Out_Flag_21																
Vertex_22X																
Vertex_22Y																
Edge_Out_Flag_22																
⋮																
Vertex_2(N)X																
Vertex_2(N)Y																
Edge_Out_Flag_2(N)																
⋮																
Vertex_(n)1X																
Vertex_(n)1Y																
Edge_Out_Flag_(n)1																
Vertex_(n)2X																
Vertex_(n)2Y																
Edge_Out_Flag_(n)2																

=411F

Vertex_21X
Vertex_21Y
Edge_Out_Flag_21
Vertex_22X
Vertex_22Y
Edge_Out_Flag_22
⋮
Vertex_2(N)X
Vertex_2(N)Y
Edge_Out_Flag_2(N)
⋮
Vertex_(n)1X
Vertex_(n)1Y
Edge_Out_Flag_(n)1
Vertex_(n)2X
Vertex_(n)2Y
Edge_Out_Flag_(n)2
⋮
Vertex_(n)(N)X
Vertex_(n)(N)Y
Edge_Out_Flag_(n)(N)

On page 92, paragraph 5.2.2.1.26 Input Polygon elements. change to Input Polygon and Polygon Set elements.

On page 100, paragraph 5.2.2.2.25 Output Polygon elements. change to Output Polygon and Polygon Set elements.

On page 106 add paragraph 6.1.1.1 Polygon Set example. The following example represents a polygon set which includes a red filled polygon and two smaller polygons that are transparent. The three polygons are relative to the VDC Extent origin.

On page 106 add TABLE 111A. Polygon Set example.

CGM ELEMENT	HEX VALUES
BEGIN METAFILE ("POLYGON SET")	0X002C 0X0B50 0X4F4C 0X5947 0X4F4E 0X2053 0X4554
METAFILE VERSION (1)	0X1022 0X0001
METAFILE DESCRIPTION ("POLYGON SET")	0X104C 0X0B50 0X4F4C 0X5947 0X4F4E 0X2053 0X4554
METAFILE ELEMENT LIST	0X1166 0X0001 0XFFFF 0X0001
BEGIN PICTURE ("POLYGON SET")	0X006C 0X0B50 0X4F4C 0X5947 0X4F4E 0X2053 0X4554
COLOR SELECTION MODES (DIRECT = 1)	0X2042 0X0001
EDGE WIDTH SPECIFICATION MODE	0X20A2 0X0000
VDC EXTENT	0X20C8 0X0000 0X7FFF 0X7FFF 0X0000
BEGIN PICTURE BODY	0X0080
FILL COLOR (RED)	0X52E3 0XFF00 0X0000
INTERIOR STYLE (SOLID=1)	0X52C2 0X0001
EDGE VISIBILITY (ON)	0X53C2 0X0001
EDGE WIDTH (7)	0X5382 0X0007
EDGE TYPE (DASHED)	0X5362 0X0002
EDGE COLOR (BLUE)	0X53A3 0X0000 0XFF00

POLYGON SET				0X411F
0,0	1000,0	1000,1000,	0,1000	0X0048
250,250	350,250,	350,350,	250,350	0X0000
550,550	650,550	650,650	550,650	0X0000
				0X0001
				0X03E8
				0X0000
				0X0001
				0X03E8
				0X03E8
				0X0001
				0X0000
				0X03E8
				0X0002
				0X00FA
				0X00FA
				0X0001
				0X015E
				0X00FA
				0X0001
				0X015E
				0X015E
				0X0001
				0X00FA
				0X015E
				0X0002
				0X0226
				0X0226
				0X0001
				0X028A
				0X0226
				0X0001
				0X028A
				0X028A
				0X0001
				0X0226
				0X028A
				0X0002
END PICTURE				0X00A0
END METAFILE				0X0040

B. Rationale for recommendation:

Experience with field use of NITFS, particularly with mapping applications, indicates the need to allow for use of polygon sets.